
Science Flight Report

Operation IceBridge Arctic 2012



Flight: F11

Mission: CryoSat-2 underflight & Inglefield Bredning/Qaanaaq

Flight Report Summary

Aircraft	P-3B (N426NA)
Flight Number	12
Flight Request	12P006
Date	Wednesday, March, 2012 (Z)
Purpose of Flight	Operation IceBridge Mission CryoSat-2 and Inglefield Bredning
Take off time	10:59 Zulu from Thule Air Base (BGTL)
Landing time	18:43 Zulu at Thule Air Base (BGTL)
Flight Hours	8.0 hours
Aircraft Status	Airworthy.
Sensor Status	All installed sensors operational.
Significant Issues	None
Accomplishments	<ul style="list-style-type: none">• High altitude (10,000 ft) and low-altitude survey (1,500 ft AGL) of sea ice transects along CryoSat-2 orbit 10450.• CryoSat-2 underpass at 15:41 Z.• Completed a profile over Inglefield Bredning that has been surveyed by a field party on the ground the day before.• Completed a glacier run along Tracy Glacier, which leads into Inglefield Bredning.• Completed entire mission as planned except for the last 40 nautical miles on CS-2 orbit 10450 because of low clouds and low ground speed.• ATM, snow, Ku-band, gravimeter, magnetometer, DMS and KT-19 skin temperature sensor were operated on the survey lines.• The MCoRDS and accumulation radars were not in operation due to sea ice mission.• Several pitch and roll maneuvers over sea ice for snow and Ku-band radar calibration.• Ramp pass at Thule at 1,500 ft AGL.
Geographic Keywords	Arctic Ocean, Inglefield Bredning, Qaanaaq, Tracy Glacier
Satellite Tracks	CryoSat-2 orbit 10450
Repeat Mission	None

Science Data Report Summary

Instrument	Instrument Operational			Data Volume	Instrument Issues
	Survey Area	Entire Flight	High-alt. Transit		
ATM	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	38 GB	None
MCoRDS	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	N/A	N/A
Snow Radar	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	215 GB	None
Ku-band Radar	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	215 GB	None
Accumulation Radar	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	N/A	N/A
DMS	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	58 GB	None
KT-19 Skin Temp.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	7.5 MB	None
Gravimeter	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1.5 GB	GPS interference from HF
Magnetometer	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	120 MB	None

Mission Report (Michael Studinger, Mission Scientist)

This mission is intended to underfly ESA's CryoSat-2 spacecraft, as nearly simultaneous with the spacecraft as possible. As always the field team has plotted the CryoSat-2 predicted orbits and selected the best combination of weather and geometry subject to all constraints and flight priorities. The original plan was to fly the outbound leg at 15,000 ft AGL to get a wide as possible swath with ATM T3 to estimated drift rates. Unfortunately, the spare ATM T3 laser does not have the transmit power to do this and we planned on a maximum of 10,000 ft altitude for data collection. Both ATM laser were able to collect data from this altitude. The gap in the clouds was almost exactly where we needed it (Fig. 3). We expected to get into a dense cloud cover on the eastern end of the line that was clearly visible on the IR image. We had to descent at waypoint 104509 to get under the clouds as expected. At 14:43 Z, 44 nautical miles before the end of the line we lost the laser signal and turned around, because we also need to make up for time lost due to the lower ground speed at low altitude. CryoSat-2 passed overhead at 15:41 Z with excellent atmospheric and light conditions for data collection.

Shortly after takeoff we flew over the line at Inglefield Bredning again, since we had to abort the pass yesterday because of poor visibility. We did see tracks on the ground and equipment or markers installed at several locations along the profile. The ground experiment in Inglefield Bredning is conducting a series of sea ice field measurements, including the collection of high-precision GPS, ice thickness and snow depth observations along the center of the fjord near Qaanaaq (Fig. 2). The following measurements will be taken: EM31: Total ice thickness and snow depth; snow depth and limited property measurements; GPS: three-dimensional, cm-level, sea ice motions and deformation; IMB buoy deployments; photography.

We got 95% of the laser data during the 4.1 hours of science data collection.

Individual instrument reports from experimenters on board the aircraft:

ATM: Both ATM systems worked well and collected good data along almost the entire line in cloud free conditions. ATM collected a total of 4.1 hours of science data and got 95% coverage despite clouds.

MCoRDS: The MCoRDS system was not operated on this flight due to the sea ice mission and the team used the flight for test recordings.

Snow and Ku-band radar: The snow and Ku-band radars worked well and collected 2 hours of data during the low altitude segment of the survey. No data was lost.

Accumulation radar: Was not operated on today's flight.

Gravimeter: Worked well. One of the GPS units experiences interference after HF radio calls, but this is something that can be worked around in processing.

Magnetometer: Data was logged on the SGL system and no spikes were observed other than the usual HF radio interference.

DMS: DMS worked well and collected data on the primary system only today.

KT-19 skin temperature sensor: System worked well.

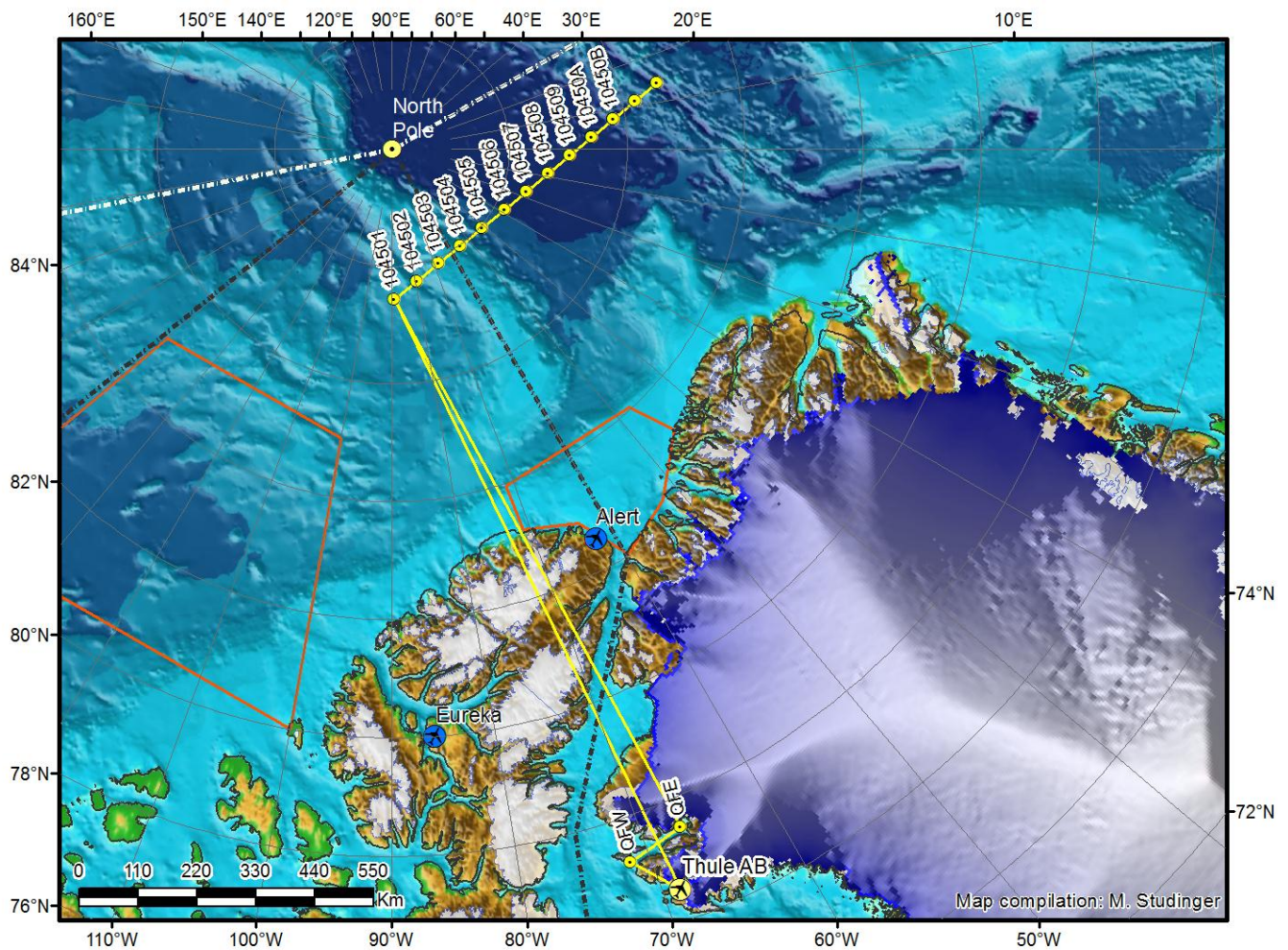


Figure 1: Today's sea ice mission plan (yellow). Red boxes outline the temporary CryoSat-2 SAR mode mask north of Alert and the "Wingham Box". We also accommodated an overflight of the ground experiment at Inglefield Bredning near Qaanaaq.

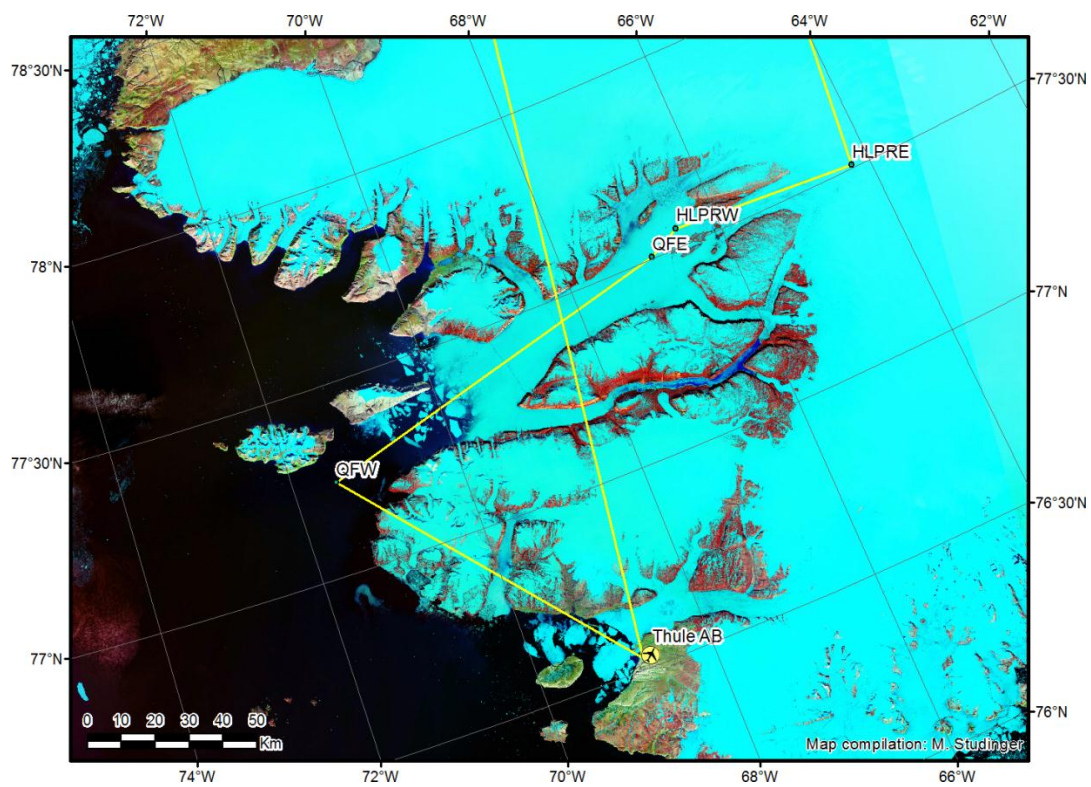


Figure 2: Map of the line along Tracy Glacier and Inglefield Bredning near Qaanaaq.

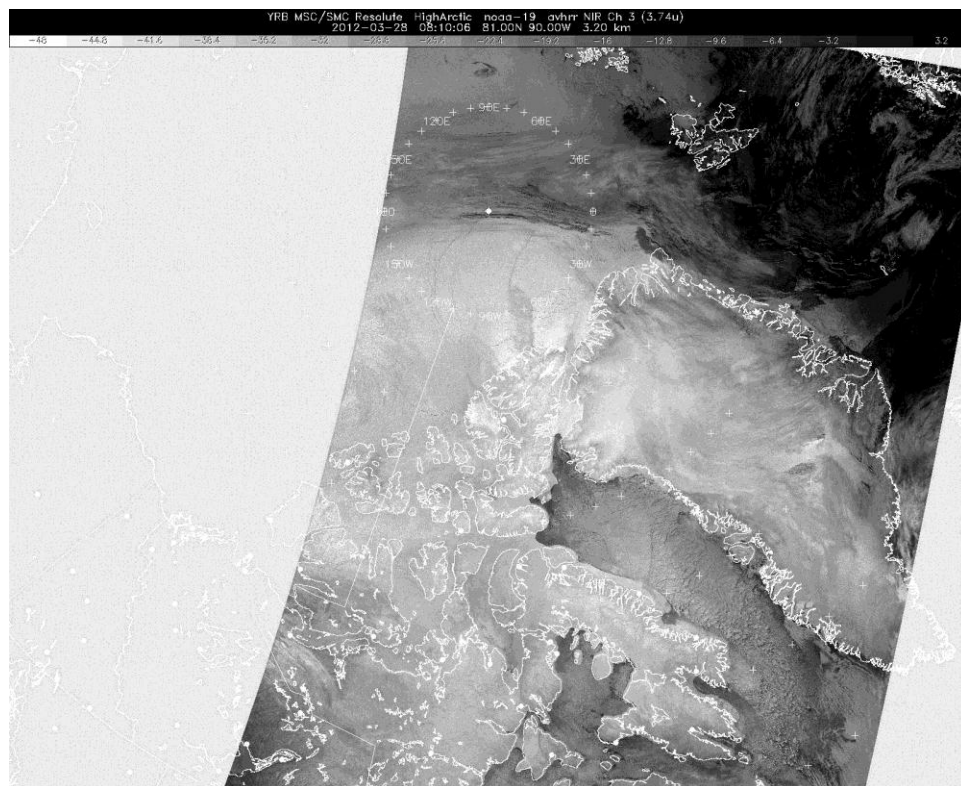


Figure 3: Infrared satellite image showing cloud cover in the survey area.